

IMAGING IN INTENSIVE CARE MEDICINE

Echo-guided air-filled endotracheal tube cuff visualization



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Upper airway ultrasound (US) may be useful to check for endotracheal tube (ETT) position but not to exclude selective mainstem bronchial intubation. When using a standard US approach in adult patients, the ETT is not always recognizable due to the impossibility of

distinguishing tissue–air-filled cuff interface artifacts from those generated by the tracheal tissue–air interface. Filling the ETT cuff with saline to overcome this problem exposes the patient to the risk of cuff rupture and potentially dangerous complications. We propose a safe,

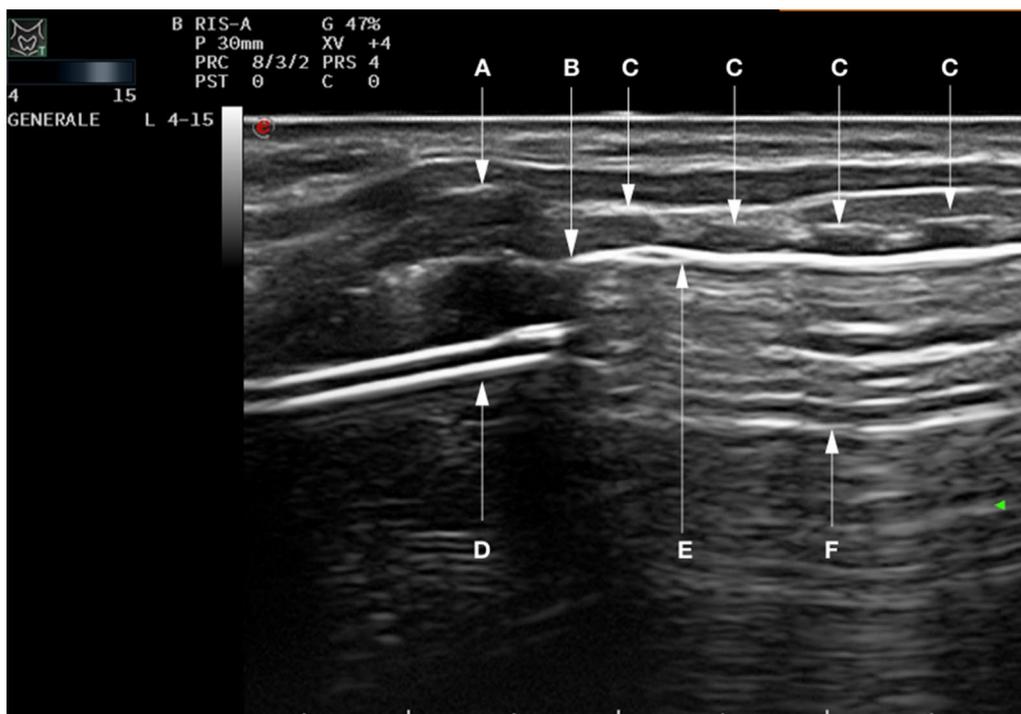


Fig. 1 A. Cricoid cartilage. B. Proximal border of endotracheal tube cuff. C. Tracheal rings. D. Lateral wall of endotracheal tube, visible as two hyperechogenic lines up to the edge of the air-filled cuff. E. Tissue–air-filled cuff interface that corresponds to the lateral border of the cuff visible as a hyperechogenic line. F. Pseudo A-line, visible as a reverberation artifact. Like A-lines, which are specific to the lung semeiotic, pseudo A-lines are repeated at twice, three times, four times, etc., the distance between the probe and the tissue–air interface (i.e., tissue–lung interface for A-lines are in this case replaced by tissue–air-filled cuff interface)

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easy, and reproducible technique for detecting the air-filled ETT cuff using a long axis lateral approach (LAL) with the head 30° rotated to allow contact of the subglottic portion of the ETT with the trachea's opposite side wall. Tracheal secretions and head rotation reduce ultrasound air interference allowing both visualization of the upper airway cartilage and the ETT cuff. The ETT wall corresponds to a double rail hyperechogenic image interrupted by air cuff artifacts visible as pseudo A-lines (Fig. 1). Visualizing the proximal cuff border below the first three tracheal rings protects against glottal injury, selective mainstem bronchial intubation, and confirms the correct depth positioning in elective, emergency, or pre-hospital clinical scenarios.

Electronic supplementary material

The online version of this article (<https://doi.org/10.1007/s00134-019-05689-9>) contains supplementary material, which is available to authorized users.

Compliance with ethical standards**Conflicts of interest**

On behalf of all authors, the corresponding author states that there are no conflicts of interest.

Informed consent

Written informed consent was given by the patient.

Ethical approval

Human and animal studies have been approved by the appropriate ethical committee and have been performed in accordance with the ethical standards of the Helsinki Declaration of 1964 and its later amendments.

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